

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1 1. (Currently amended) A method performed by a set of one or more
2 computers associated with a[[n]] database system ~~automatic database diagnostic monitoring~~
3 ~~(ADDM) device~~ for diagnosing performance in a database of the database system, the method
4 comprising:
5 receiving, at at least one computer associated with the database system,
6 information providing a specification of performance problems in a database, the specification of
7 performance problems defining:
8 one or more performance problems that may occur while processing
9 operations in the database, and
10 information that classifies each of the one or more performance problems
11 as symptoms that may lead to a root problem being either a problem having the greatest impact
12 on performance in the database or a problem that does not lead to other problems;
13 receiving, at ~~the ADDM device~~ at least one computer associated with the database
14 system, information providing operations performed in a database classified as one or more
15 ~~performance problems through~~ a set of one or more rules for the one or more performance
16 problems that may occur while processing operations in the database, each rule in the set of rules
17 defining one or more conditions for a corresponding performance problem that when met
18 indicate that at least one symptom that may lead to a root problem exists ~~one or more symptoms~~
19 ~~and at least one root performance problem;~~
20 receiving, at at least one computer associated with the database system,
21 information providing a set of one or more recommendation rules for the one or more
22 performance problems that may occur while processing operations in the database, each
23 recommendation rule in the set of recommendation rules defining:

24 one or more recommendation conditions, and
25 recommendation information indicative of a solution when the one or
26 more recommendation conditions are satisfied to a performance problem in the one or more
27 performance problems that may occur while processing operations in the database;
28 generating, at least one computer associated with the database system, a set of
29 one or more rules trees based on the specification of performance problems, the set of rules, and
30 the set of recommendation rules, the one or more rules trees configured to be traversed to
31 determine a root problem in a hierarchy of the one or more performance problems that may occur
32 while processing operations in the database, each rules tree having a set of nodes indicative of
33 the symptoms that may lead to a root problem wherein each node in the set of nodes is associated
34 with one or more rules in the set of rules and one or more recommendation rules in the set of
35 recommendation rules;
36 determining with the ADDM device receiving, from an internal process of the
37 database system configured to capture information internally from one or more sessions at a
38 computer associated with the database system, one or more values that quantify an impact for the
39 one or more performance problems based on the set of rules and performance of operations in the
40 database;
41 traversing, within the computer associated with the database system, one or more
42 rules trees in the set of rules trees to determine[[ing]] a first performance problem with the
43 ADDM device from in the one or more performance problems that may occur while processing
44 operations in the database based on whether a matching between the one or more values for the
45 one or more performance problems and satisfy the one or more conditions defined for at least
46 one rule of a node in the one or more rules trees the one or more symptoms defined by at least
47 one rule in the set of rules; and
48 determining, within the computer associated with the database system,
49 recommendation information indicative of a solution to the first performance problem in the one
50 or more performance problems based on satisfaction of one or more recommendation rules
51 associated with the node in the one or more rules trees whose at least one rule is satisfied by the
52 one or more values; and

53 generating, within the computer system associated with the database system,
54 information ~~with the ADDM device~~ indicative of a recommendation for a solution for the first
55 performance problem based on the recommendation information set of rules.

1 2. (Currently amended) The ~~computer implemented~~ method of claim 1,
2 wherein traversing, within the computer associated with the database system, the one or more
3 rules trees in the set of rules trees to determine~~[[ing]]~~ the first performance problem ~~with the~~
4 ~~ADDM device from the one or more performance problems based on the matching further~~
5 comprises ~~automatically analyzing the one or more symptoms defined by the at least one rule~~
6 ~~with the ADDM device based on the one or more values to identify the~~ identifying the first
7 performance problem as a root performance problem defined by the at least one rule as the first
8 ~~performance problem~~.

1 3. (Currently amended) The method of claim ~~[[2]]~~ 1, wherein receiving the
2 specification of performance problems defining information that classifies each of the one or
3 more performance problems as symptoms that may lead to a root problem ~~defined by the set of~~
4 ~~rules are classified from~~ comprises receiving information that classifies symptoms of a first set of
5 performance problems and ~~[[to]]~~ a second set of performance problems.

1 4. (Currently amended) The method of claim 2, wherein generating, within
2 the computer associated with the database system, the information ~~with the ADDM device~~
3 indicative of a ~~[[the]]~~ recommendation for a solution for the first performance problem
4 comprises generating the information to include symptoms that were indicated to exists based on
5 the at least one rule for analyzed by the ADDM device to determine the root performance
6 problem.

5. (Canceled)

1 6. (Currently amended) The method of claim 1, wherein receiving, from the
2 internal process of the database system configured to capture information internally from one or
3 more sessions at the computer associated with the database system, the one or more values

4 comprises~~[[ing]]~~ receiving time values from the internal process of the database system that
5 quantify the impact of the one or more performance problems.

1 7. (Currently amended) The method of claim 6, further comprising
2 determining, within the internal process of the database system, the time values ~~with the ADDM~~
3 ~~device~~ using at least one of:
4 a time model that classifies operations in the database as wasteful
5 operations ~~using a first set of rules associated with the time model,~~ and
6 a wait model that classifies operations in the database waiting for
7 completion of one or more external events ~~using a second set of rules associated with the wait~~
8 ~~model.~~

1 8. (Currently amended) The method of claim 1, wherein traversing, within
2 the computer associated with the database system, the one or more rules trees in the set of rules
3 trees to determine the first performance problem ~~generating the information with the ADDM~~
4 ~~device indicative of the recommendation for the solution~~ comprises:
5 determining, within the computer associated with the database system, ADDM
6 ~~device~~ one or more operations in the database that caused the first performance problem; and
7 analyzing, within the computer system associated with the database system,
8 information stored in the database of the database system ~~information with the ADDM device~~ for
9 the one or more operations ~~absent direct user intervention~~ to determine the first performance
10 problem ~~generate the information with the ADDM device indicative of the recommendation for~~
11 ~~the solution.~~

1 9. (Currently amended) The method of claim 8, wherein the ~~stored~~
2 information stored in the database of the database system comprises a snapshot of information
3 for the one or more operations taken by the internal process of the database system.

1 10. (Currently amended) The method of claim 1 further comprising
2 ~~automatically~~ determining, within the computer associated with the database system, ADDM

3 ~~device~~ the another recommendation for ~~[[the]]~~ a solution for the first performance problem in
4 response to determining the first performance problem ~~with the ADDM device~~.

1 11. (Currently amended) The method of claim 1, further comprising:
2 determining, within the computer associated with the database system, [[a]] the
3 one or more recommendation rules ~~with the ADDM device~~ from a set of recommendation rules
4 associated with the node in the one or more rules trees whose at least one rule is satisfied by the
5 one or more values ~~first performance problem~~, each recommendation rule in the set of
6 recommendation rules indicative of at least one recommendation for a solution for the ~~first~~
7 performance problem represented by the node;
8 determining, within the computer associated with the database system, ADDM
9 ~~device~~ one or more operations that caused the first performance problem; and
10 wherein determining, within the computer associated with the database system,
11 recommendation information indicative of a solution to the first performance problem in the one
12 or more performance problems comprises:
13 applying the one or more recommendation rules ~~using the ADDM device~~
14 to information associated with the one or more operations; and
15 determining a recommendation ~~with the ADDM device~~ for ~~[[the]]~~ a
16 solution for the first performance problem in response to a determination that the information
17 associated with the ~~at the ADDM device that the~~ one or more operations satisfies~~[[y]]~~ the one or
18 more recommendation rules.

1 12. (Currently amended) The method of claim 1, further comprising
2 outputting the information indicative of a recommendation for [[the]] a solution for the first
3 performance problem using the computer associated with the database system ~~ADDM device~~.

1 13. (Currently amended) The method of claim 1, further comprising
2 generating, within the computer associated with the database system, information with the
3 ~~ADDM device~~ specifying one or more operations performed in the database that are not causing
4 performance problems.

1 14. (Currently amended) A computer-implemented method for automatically
2 diagnosing one or more performance problems in a database of a database system, the method
3 comprising:

4 receiving, at a computer system associated with the database system, information
5 providing a specification of performance problems in the database, the specification of
6 performance problems defining:

7 one or more performance problems that may occur while processing
8 operations in the database, and

9 information that classifies each of the one or more performance problems
10 as symptoms that may lead to a root problem being either a problem having the greatest impact
11 on performance in the database or a problem that does not lead to other problems;

12 receiving, at the computer system associated with the database system,
13 ~~information at a database monitoring device classifying operations performed in a database into~~
14 ~~one or more performance problems through~~ providing a set of one or more rules for the one or
15 more performance problems that may occur while processing operations in the database, each
16 rule in the set of rules defining a set of one or more conditions for a corresponding performance
17 problem that when met indicate that one or more symptoms that may lead to [[and]] at least one
18 root performance problem exist;

19 receiving, at the computer system associated with the database system,
20 information providing a set of one or more recommendation rules for the one or more
21 performance problems that may occur while processing operations in the database, each
22 recommendation rule in the set of recommendation rules defining:

23 one or more recommendation conditions, and
24 recommendation information indicative of a solution when the one or
25 more recommendation conditions are satisfied to a performance problem in the one or more
26 performance problems that may occur while processing operations in the database;

27 generating, at the computer system associated with the database system, a set of
28 one or more rules trees based on the specification of performance problems, the set of rules, and

29 the set of recommendation rules, the one or more rules trees configured to be traversed to
30 determine a root problem in a hierarchy of the one or more performance problems that may occur
31 while processing operations in the database, each rules tree having a set of nodes indicative of
32 the symptoms that may lead to a root problem wherein each node in the set of nodes is associated
33 with one or more rules in the set of rules and one or more recommendation rules in the set of
34 recommendation rules;

35 collecting information using an internal process of the database system
36 ~~monitoring device~~ that quantifies an impact for one or more operations performed in the database
37 ~~based on the set of rules;~~

38 associating, within the computer system associated with the database system, the
39 information that quantifies an impact for one or more operations with the one or more
40 performance problems ~~classified by the set of rules using the database monitoring device;~~

41 analyzing, within the computer system associated with the database system, the
42 associated information for the one or more performance problems ~~with the database monitoring~~
43 ~~device~~ based on one or more rules trees in the set of rules trees ~~classifying operations performed~~
44 ~~in the database into the one or more performance problems~~ to determine a first performance
45 ~~problem with the database monitoring device from in the one or more performance problems that~~
46 may occur while processing operations in the database in response to whether the associated
47 information satisfies the one or more conditions defined for at least one rule of a node in the one
48 or more rules tree; and

49 determining, within the computer system associated with the database system,
50 recommendation information indicative of a solution to the first performance problem in the one
51 or more performance problems based on satisfaction of one or more recommendation rules
52 associated with the node in the one or more rules trees whose at least one rule is satisfied by the
53 one or more values; and

54 generating, within the computer system associated with the database system,
55 ~~information with the database monitoring device~~ indicative of a recommendation for a solution
56 for the first performance problem based on the recommendation information.

1 15. (Currently amended) The computer-implemented method of claim 14,
2 wherein collecting the information using the internal process of the database system that
3 quantifies an impact for one or more operations performed in the database comprises:
4 determining, within the internal process of the database system, ~~monitoring device~~
5 when one or more operations ~~that are associated with the one or more performance problems~~ are
6 being performed; and
7 timing the one or more operations ~~that are associated with the one or more~~
8 ~~performance problems with the database monitoring device~~ using the internal process to generate
9 one or more time values for the one or more operations ~~using the database monitoring device~~ that
10 quantify the impact of the one or more operations.

1 16. (Currently amended) The computer-implemented method of claim 15,
2 wherein timing the one or more operations using the internal process ~~comprises that are~~
3 ~~associated with the one or more performance problems are determined with the database~~
4 ~~monitoring device~~ timing the one or more operations based on at least one of:
5 a time model that classifies a first set of operations in the database as
6 wasteful operations ~~using a first set of rules associated with the time model,~~ and
7 a wait model that classifies a second set of operations in the database
8 waiting for completion of one or more external events ~~using a second set of rules associated with~~
9 ~~the wait model.~~

1 17. (Currently amended) The computer-implemented method of claim 14,
2 wherein analyzing, within the computer system associated with the database system, the
3 associated information for the one or more performance problems ~~with the database monitoring~~
4 ~~device~~ based on the one or more rules trees in the set of rules ~~classifying operations performed in~~
5 ~~the database into the one or more performance problems to determine the first performance~~
6 ~~problem from the one or more performance problems~~ comprises automatically analyzing the one
7 ~~or more symptoms defined by at least one rule in the set of rules with the database monitoring~~
8 ~~device to identify the~~ identifying the first performance problem as a root performance problem

9 ~~defined by the at least one rule using the database monitoring device as the first performance~~
10 ~~problem.~~

1 18. (Currently amended) The computer-implemented method of claim 14
2 [[17]], wherein generating, within the computer system associated with the database system, the
3 information ~~with the database monitoring device~~ indicative of a [[the]] recommendation for a
4 solution for the first performance problem comprises generating the information ~~with the~~
5 ~~database monitoring device~~ to include [[the]] one or more symptoms indicated to exists based on
6 the at least one rule for ~~that were analyzed to determine~~ the root performance problem.

19. (Canceled)

1 20. (Currently amended) The computer-implemented method of claim 14,
2 wherein analyzing, within the computer system associated with the database system, the
3 associated information for the one or more performance problems ~~generating the information~~
4 ~~with the database monitoring device~~ indicative of the recommendation for the solution
5 comprises:

6 determining, within the computer system associated with the database system, at
7 ~~the database monitoring device~~ one or more operations in the database that caused the first
8 performance problem; and

9 reviewing, within the computer system associated with the database system,
10 stored information for the one or more operations ~~at the database monitoring device~~ to determine
11 the first performance problem ~~generate the information with the database monitoring device~~
12 ~~indicative of the recommendation for the solution.~~

1 21. (Currently amended) The computer-implemented method of claim 20,
2 wherein the stored information comprises a snapshot of information for the one or more
3 operations taken by the internal process of the database system.

1 22. (Currently amended) The computer-implemented method of claim 14,
2 further comprising ~~automatically~~ determining, within the computer system associated with the

3 ~~database system, with the database monitoring device the~~ another recommendation for a ~~[[the]]~~
4 solution for the first performance problem in response to determining the first performance
5 problem.

1 23. (Currently amended) The computer-implemented method of claim 14,
2 further comprising:

3 determining, within the computer system associated with the database system,
4 ~~with the database monitoring device a~~ the one or more recommendation rules from a set of
5 recommendation rules associated with the node in the one or more rules trees whose at least one
6 rule is satisfied ~~first performance problem~~, each recommendation rule in the set of
7 recommendation rules indicative of at least one recommendation for a solution to the ~~first~~
8 performance problem represented by the node;

9 determining, within the computer system associated with the database system,
10 ~~with the database monitoring device~~ one or more operations that caused the first performance
11 problem; and

12 wherein analyzing, within the computer system associated with the database
13 system, the associated information for the one or more performance problems based on the one
14 or more rules trees in the set of rules trees to determine the first performance problem comprises:

15 applying the one or more recommendation rules ~~with the database~~
16 ~~monitoring device~~ to information associated with the one or more operations; and

17 determining a recommendation for ~~[[the]]~~ a solution to the first
18 performance problem ~~with the database monitoring device~~ in response to a determination ~~at the~~
19 ~~database monitoring device~~ that the information associated with the one or more operations
20 satisfies ~~[[y]]~~ the one or more recommendation rules.

1 24. (Currently amended) The computer-implemented method of claim 14,
2 further comprising outputting the information indicative of the recommendation for ~~[[the]]~~ a
3 solution for the first performance problem using the computer system associated with the
4 database system ~~monitoring device~~.

1 25. (Currently amended) The computer-implemented method of claim 14,
2 further comprising generating, within the computer system associated with the database system,
3 ~~information with the database monitoring device~~ specifying one or more operations performed in
4 the database that are not causing performance problems.

1 26. (Currently amended) A computer-readable storage medium configured to
2 store a set of code modules which when executed by a processor of a computer system become
3 operational with the processor for diagnosing performance in a database associated with a
4 database system, the computer-readable storage medium comprising:

5 code for receiving information providing a specification of performance problems
6 in a database, the specification of performance problems defining:

7 one or more performance problems that may occur while processing
8 operations in the database, and

9 information that classifies each of the one or more performance problems
10 as symptoms that may lead to a root problem being either a problem having the greatest impact
11 on performance in the database or a problem that does not lead to other problems;

12 code for receiving information providing operations performed in a database
13 ~~classified as one or more performance problems through~~ a set of one or more rules for the one or
14 more performance problems that may occur while processing operations in the database, each
15 rule in the set of rules defining one or more conditions for a corresponding performance problem
16 that when met indicating that at least one symptom that may lead to a root problem exists
17 ~~symptoms and at least one root performance problem;~~

18 code for receiving information providing a set of one or more recommendation
19 rules for the one or more performance problems that may occur while processing operations in
20 the database, each recommendation rule in the set of recommendation rules defining:

21 one or more recommendation conditions, and

22 recommendation information indicative of a solution when the one or
23 more recommendation conditions are satisfied to a performance problem in the one or more
24 performance problems that may occur while processing operations in the database;

25 code for generating a set of one or more rules trees based on the specification of
26 performance problems, the set of rules, and the set of recommendation rules, the one or more
27 rules trees configured to be traversed to determine a root problem in a hierarchy of the one or
28 more performance problems that may occur while processing operations in the database, each
29 rules tree having a set of nodes indicative of the symptoms that may lead to a root problem
30 wherein each node in the set of nodes is associated with one or more rules in the set of rules and
31 one or more recommendation rules in the set of recommendation rules;

32 code for ~~determining~~ receiving, from an internal process of the database system
33 configure to capture information internally from one or more sessions, one or more values that
34 quantify an impact for the one or more performance problems based on ~~the set of rules and~~
35 performance of operations in the database;

36 code for ~~traversing one or more rules trees in the set of rules trees to~~
37 determine[[ing]] a first performance problem ~~from in~~ the one or more performance problems ~~that~~
38 may occur while processing operations in the database based on ~~whether a matching between~~ the
39 one or more values ~~for the one or more performance problems and~~ satisfy the one or more
40 conditions defined fro at least one rule of a node in the one or more rules trees ~~the one or more~~
41 symptoms defined by at least one rule in the set of rules; and

42 code for determining recommendation information indicative of a solution for the
43 first performance problem in the one or more performance problems based on satisfaction of one
44 or more recommendation rules associated with the node in the one or more rules trees whose at
45 least one rule is satisfied by the one or more values; and

46 code for generating information indicative of a recommendation for a solution for
47 the performance problem based on the recommendation information.

1 27. (Currently amended) The computer-readable storage medium of claim 26,
2 further comprising code for ~~automatically~~ determining [[the]] another recommendation for a
3 [[the]] solution for the first performance problem in response to determining the first
4 performance problem.

1 28. (Currently amended) The computer-readable storage medium of claim 26,
2 further comprising:

3 code for determining [[a]] the one or more recommendation rules from a set of
4 recommendation rules associated with the node in the one or more rules trees whose at least one
5 rule is satisfied by the one or more values ~~first performance problem~~, each recommendation rule
6 in the set of recommendation rules indicative of at least one recommendation for a solution for
7 the first performance problem represented by the node;

8 code for determining one or more operations that caused the first performance
9 problem;

10 code for applying the one or more recommendation rules to information
11 associated with the one or more operations; and

12 code for determining a recommendation for [[the]] a solution for the first
13 performance problem in response to a determination that the information associated with the one
14 or more operations satisfies[[y]] the one or more recommendation rules.

1 29. (Currently amended) A computer-readable storage medium configured to
2 store a set of code modules which when executed by a processor of a computer system become
3 operational with the processor for automatically diagnosing one or more performance problems
4 in a database of a database system, the computer-readable storage medium comprising:

5 code for receiving information providing a specification of performance problems
6 in the database, the specification of performance problems defining:

7 one or more performance problems that may occur while processing
8 operations in the database, and

9 information that classifies each of the one or more performance problems
10 as symptoms that may lead to a root problem being either a problem having the greatest impact
11 on performance in the database or a problem that does not lead to other problems;

12 code for receiving information ~~classifying operations performed in a database into~~
13 ~~one or more performance problems through~~ providing a set of one or more rules for the one or
14 more performance problems that may occur while processing operations in the database, each

rule in the set of rules defining a set of one or more conditions for a corresponding performance problem that when met indicated that one or more symptoms that may lead to [[and]] at least one root performance problem exist;

code for receiving information providing a set of one or more recommendation rules for the one or more performance problems that may occur while processing operations in the database, each recommendation rule in the set of recommendation rules defining:

one or more recommendation conditions, and
recommendation information indicative of a solution when the one or more recommendation conditions are satisfied to a performance problem in the one or more performance problems that may occur while processing operations in the database;

code for generating a set of one or more rules trees based on the specification of performance problems, the set of rules, and the set of recommendation rules, the one or more rules trees configured to be traversed to determine a root problem in a hierarchy of the one or more performance problems that may occur while processing operations in the database, each rules tree having a set of nodes indicative of the symptoms that may lead to a root problem wherein each node in the set of nodes is associated with one or more rules in the set of rules and one or more recommendation rules in the set of recommendation rules;

code for collecting information using an internal process of the database system that quantifies an impact for one or more operations performed in the database ~~based on the set of rules;~~

code for associating the information that quantifies an impact for one or more operations with the one or more performance problems ~~classified by the set of rules;~~

code for analyzing the associated information for the one or more performance problems based on one or more rules trees in the set of rules trees classifying operations performed in the database into the one or more performance problems to determine a first performance problem from in the one or more performance problems that may occur while processing operations in the database in response to whether the associated information satisfies the one or more conditions defined for at least one rule of a node in the one or more rules tree;

and

44 code for determining recommendation information indicative of a solution for the
45 first performance problem in the one or more performance problems based on satisfaction of one
46 or more recommendation rules associated with the node in the one or more rules trees whose at
47 least one rule is satisfied by the one or more values; and
48 code for generating information indicative of a recommendation for a solution for
49 the first performance problem.

1 30. (Currently amended) The computer-readable storage medium of claim 29,
2 wherein the code for collecting the information using the internal process of the database system
3 that quantifies an impact for one or more operations performed in the database comprises:
4 code for determining when one or more operations that are associated with the
5 one or more performance problems are being performed; and
6 code for timing the one or more operations that are associated with the one or
7 more performance problems to generate one or more time values for the operations that quantify
8 the impact of the operations.

1 31. (Currently amended) The computer-readable storage medium of claim 29,
2 wherein the code for analyzing the associated information for the one or more performance
3 problems based on the one or more rules trees in the set of rules trees to determine the first
4 performance problem generating the information indicative of the recommendation for the
5 solution comprises:
6 code for determining one or more operations in the database that caused the
7 performance problem; and
8 code for reviewing stored information for the one or more operations ~~absent direct~~
9 ~~user intervention to~~ determine the first performance problem generate the information indicative
10 ~~of the recommendation for the solution.~~

1 32. (Currently amended) The computer-readable storage medium of claim 29,
2 further comprising code for ~~automatically~~ determining another [[the]] recommendation for

3 [[the]] a solution for the first performance problem in response to determining the first
4 performance problem.

1 33. (Currently amended) The computer-readable storage medium of claim 29,
2 further comprising:

3 code for determining [[a]] the one or more recommendation rules from a set of
4 recommendation rules associated with the node in the one or more rules trees whose at least one
5 rule is satisfied by the one or more values ~~determined performance problem~~, each
6 recommendation rule in the set of recommendation rules indicative of at least one
7 recommendation for a solution to the first ~~determined~~ performance problem represented by the
8 node;

9 code for determining one or more operations that caused the performance
10 problem;

11 code for applying the one or more recommendation rules to information
12 associated with the one or more operations; and

13 code for determining a recommendation for [[the]] a solution for the first
14 performance problem in response to a determination that the information associated with the one
15 or more operations satisfies[[y]] the one or more recommendation rules.